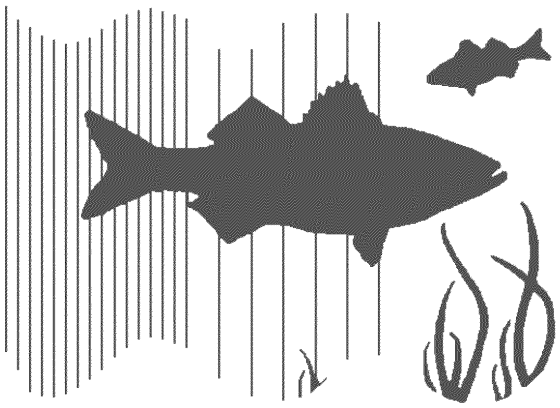
Lower Passaic River, Newark Bay and NY/NJ Harbor: Dredged Material Management ???



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Diamond Alkali Superfund Site
(Lower Passaic River and Newark Bay) &
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Passaic River Coalition

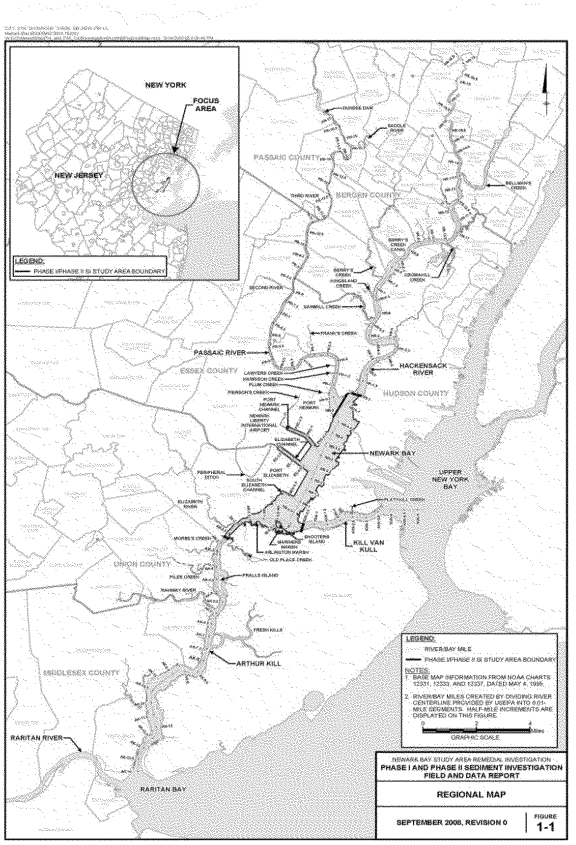
December 2011

Passaic River Coalition

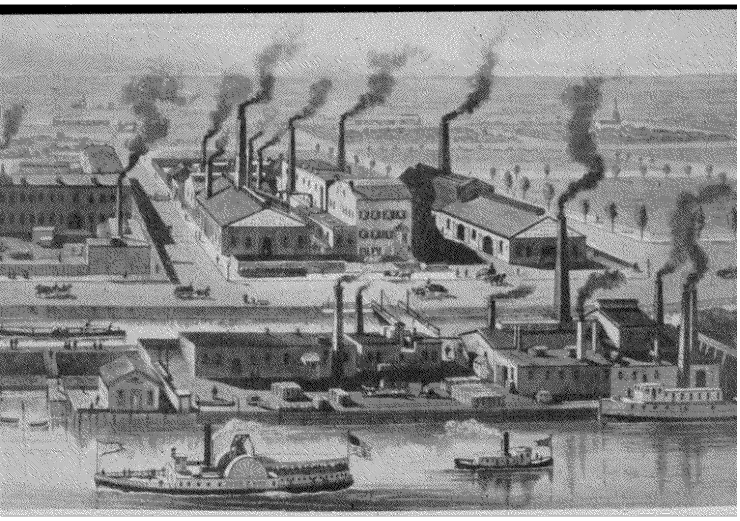
Navigable, Fishable Waters aren't just our Goals.
They are our Future!!!

Lower Passaic River, Newark Bay and NY/ NJ Harbor

The Lower Passaic River and Newark Bay are critical parts of the NY/NJ Harbor Estuary, a hub of economic activity in America, because these waters provide so many ecological benefits, including shipping access to the world.



Harbor Benefits

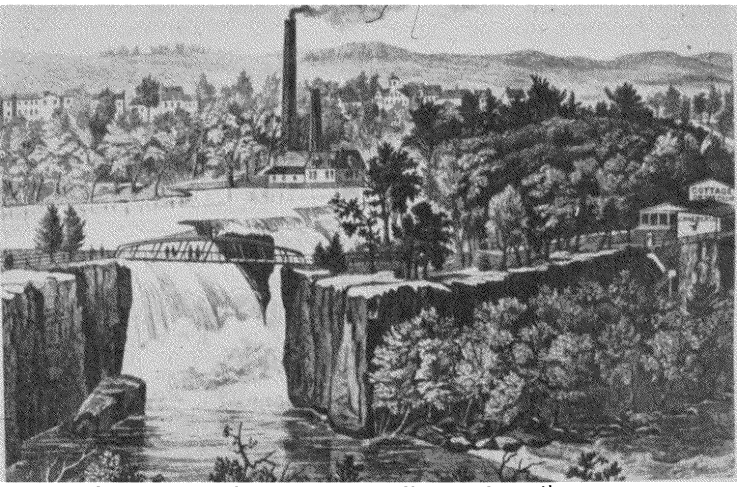


Sketch of the waterfront circa 1920

Early on European Settlers realized the importance of the Passaic River. The location of Newark made it ideal as a center of trade and commerce because of its easy access to the Harbor.

Engraving of Newark 1844

Passaic River and Newark Bay Benefits



Industry at the Great Falls mid 19th Century

In 1791 Alexander Hamilton realized the power of the waters of the Passaic River going over the Great Falls and founded the Society for Establishing Useful Manufactures at the start of the Industrial Revolution.

Many industries and businesses were developed along the Passaic River and Newark Bay because these waters provide access to shipping and many other benefits.

Dredging Problems in Lower Passaic River

But shipping needs the navigation channels to be dredged. The river was also a place to dump stuff, including PCBs and dioxin. Because there's been no place to dispose of the dredged material, most of the Lower Passaic River has not been dredged since the 1940s.

Dredging Problems in Newark Bay:
Economy threatened because of difficulties in dredging contaminated sediments in harbor!

Dredging Problems in Harbor
NY/ NJ Harbor Deepening Navigation Projects

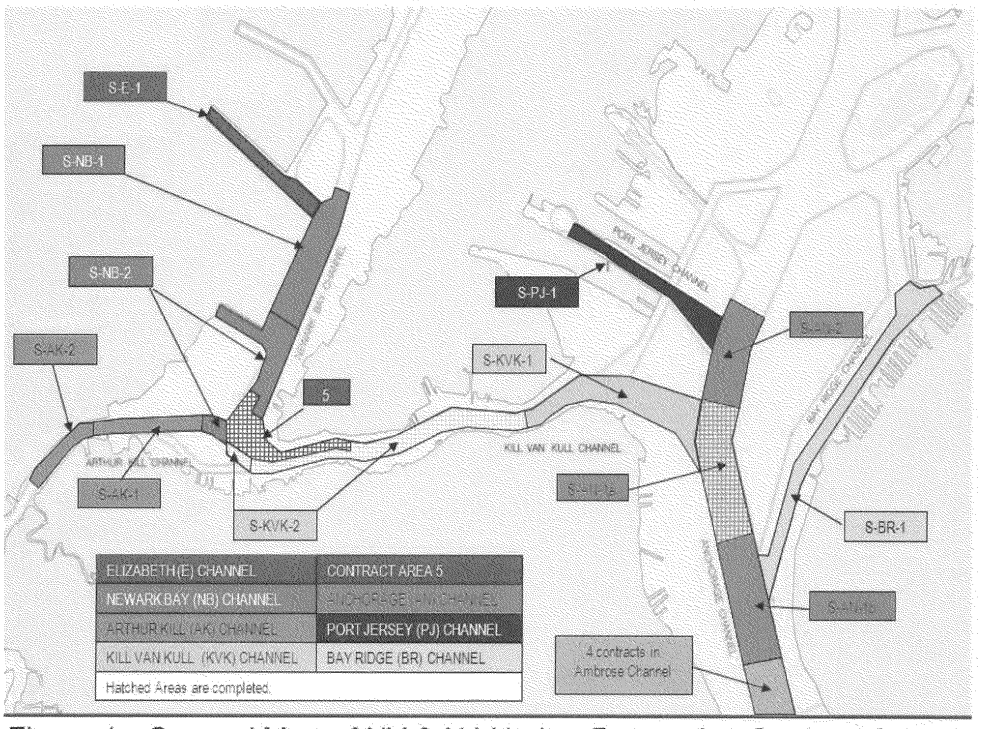


Figure 1 - General Map of NY & NJ Harbor Deepening Contract Areas

Dredged Material Management (DMM) Problems in Harbor

Until 1997:

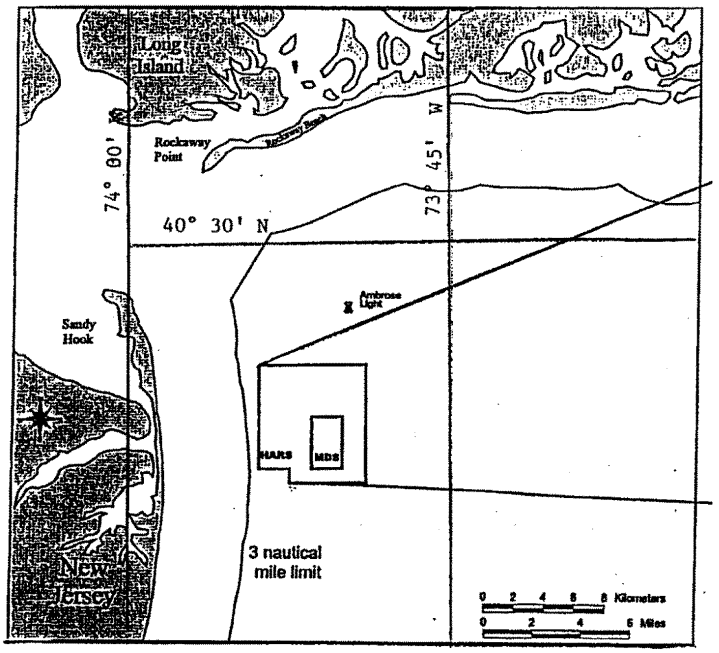
- All Harbor DMM at "Mud Dump Site" in ocean

1997 to 2012:

- Only clean DMM at Historic Area Remediation Site (HARS) in ocean
- Contaminated DMM in CDFs in Newark Bay

After 2012:

- Contaminated DMM ???



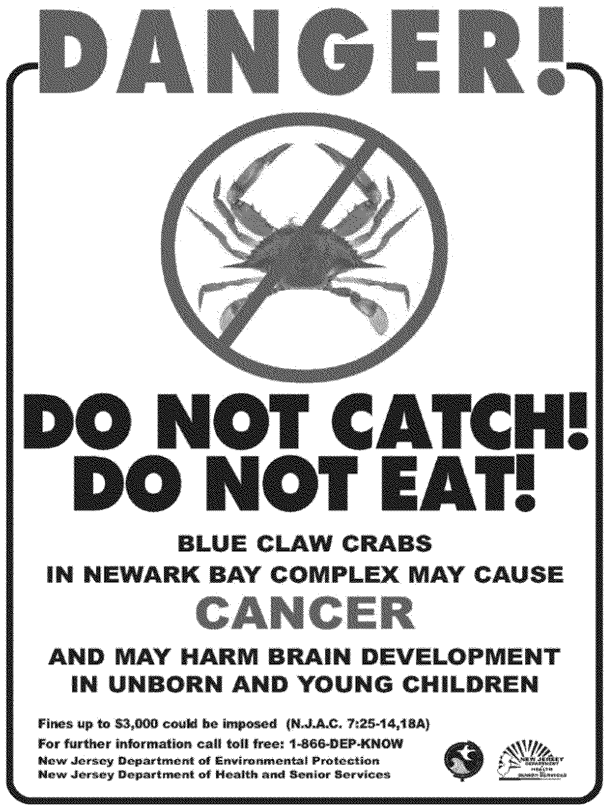
Historic Area Remediation Site (HARS) in Ocean

Fish Problems in the Newark Bay Complex: Dead crabs lie atop contaminated sediments.

Health Problems from Fishing in Lower Passaic River and Newark Bay Complex

People are eating crabs and other fish containing toxic levels of dioxin!

Although fishing for crabs and other fish is prohibited, almost half of the anglers interviewed by NJDEP staff in 2002 reported eating blue claw crabs from the Newark Bay Complex.



Future of Lower Passaic River, Newark Bay and NY/ NJ Harbor:

How shall we work for a better future?

- All these problems are caused primarily by the contamination of river and estuary sediments with persistent toxic compounds, PCBs and dioxin.
- Should the goals of the Lower Passaic River Restoration Project (LPRRP) be to remediate the contaminated sediments so that the Lower Passaic River, Newark Bay and all of NY/NJ Harbor are “navigable” and “fishable”?
- How should we clean up these contaminated sediments?

Actions for Dredging and DMM in the NY/ NJ Harbor

U.S. Army Corps of Engineers:

- "The Port of New York and New Jersey must be dredged to maintain navigation and commerce estimated to generate about $20 billion annually in direct and indirect benefits."
- Need a DMM Plan that gives "special emphasis to beneficial uses of the material needing to be dredged to maintain efficient waterborne transportation into and out of the Port."

We propose these actions:

Action 1, Dredge Legacy Pollutants (PCBs and Dioxin) from Lower Passaic River

Action 2, Move Dredged Sediments from Water to Land

Action 3, Decontaminate Dredged Sediments for Beneficial Uses

Action 1, Dredge Legacy Pollutants (PCBs and Dioxin) from Lower Passaic River

History of Legacy Pollutants --

1929 to 1979: Manufacture and dumping of PCBs

1940 to 20??: Navigation channels not dredged in Lower Passaic River

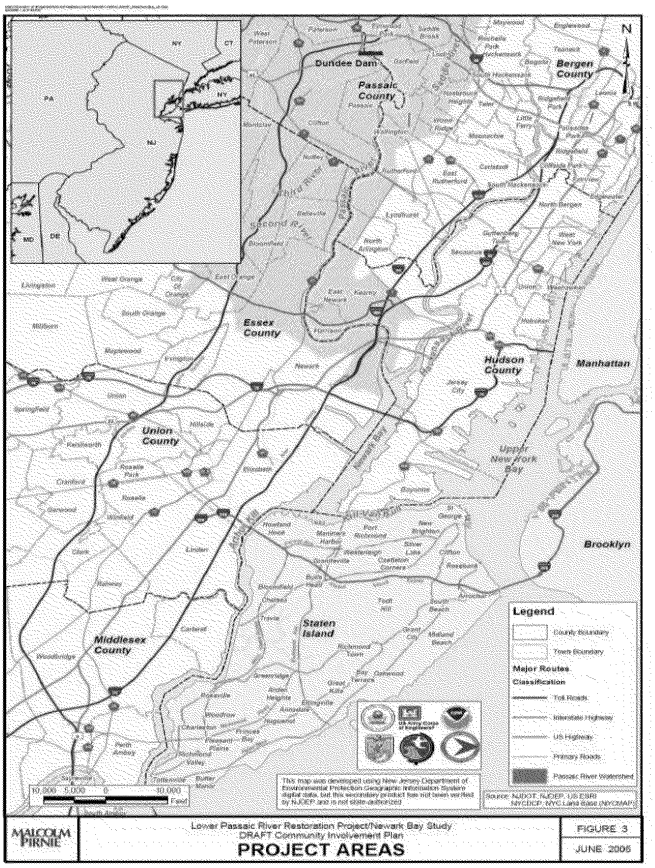
1960s: Manufacture of Agent Orange at Diamond Alkali site and dumping of Dioxin into Lower Passaic River

1984 to 20??: Ban on eating shellfish and fish from Lower Passaic River

1984 to 20??: **DO NOT CATCH! DO NOT EAT!** "**Blue Claw Crab Alert**" in the Newark Bay Region

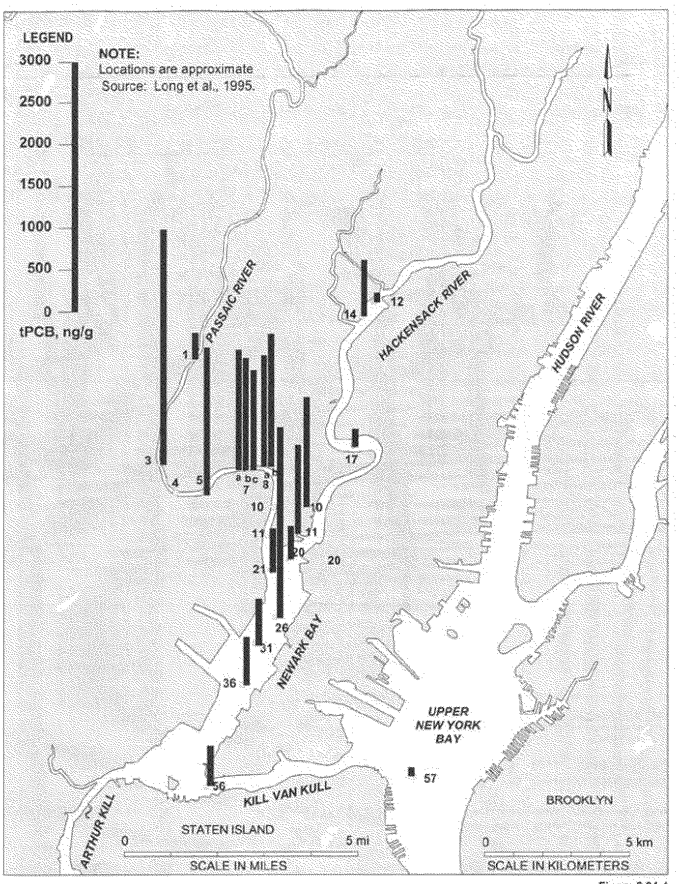
1984 to 20??: At Diamond Alkali Superfund Site PCBs and Dioxin persist in Lower Passaic River and Newark Bay Region sediments

20??: Removal by dredging of Lower Passaic River sediments highly contaminated with PCBs and dioxin begins



Sediment Contamination: PCBs

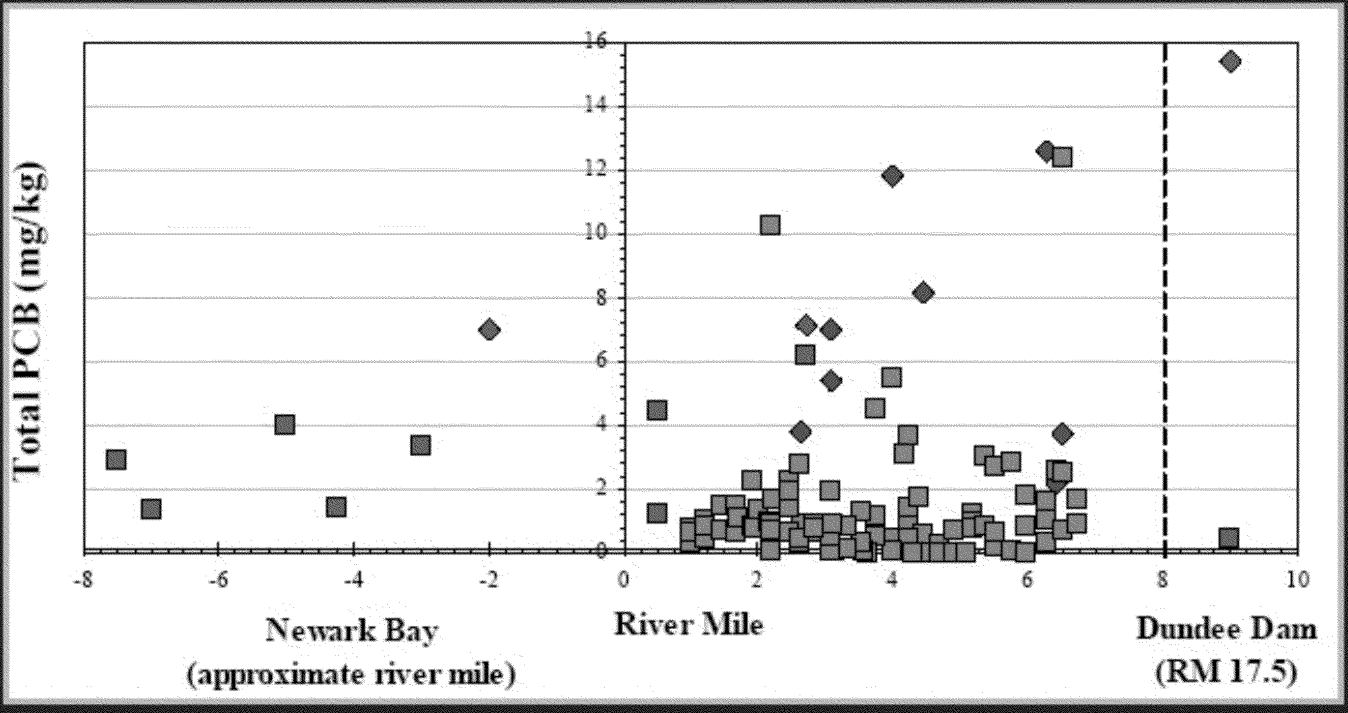
PCBs (polychlorinated biphenyls) are persistent organic compounds that are toxic to benthic organisms and fish as well as people. The maximum level of total PCBs that would be considered acceptable in non-residential soils and river sediments is 14 parts per billion of soil (ng/g). In the Lower Passaic River sediments, PCB levels were over 12,000 ng/g in the 1960s and as high as 2,800 ng/g in the 1990s.



U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Figure 3.04-4
Concentrations of Total PCBs at Selected Stations in Newark Bay and Vicinity

Total PCB: 1963 and 1995 Concentrations

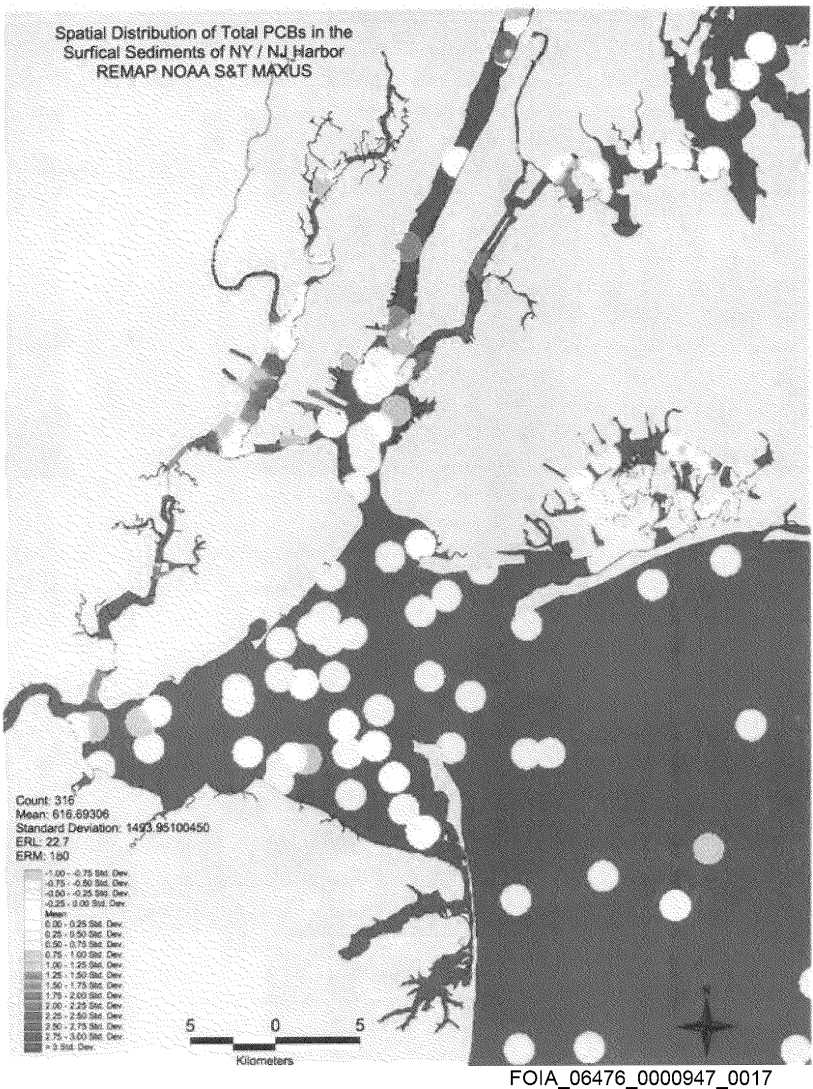


1963 Concentration
1963 (Bopp *et al.*)
1995 Concentration
1985 (Bopp *et al.*)

Sediment Contamination: PCBs in Newark Bay

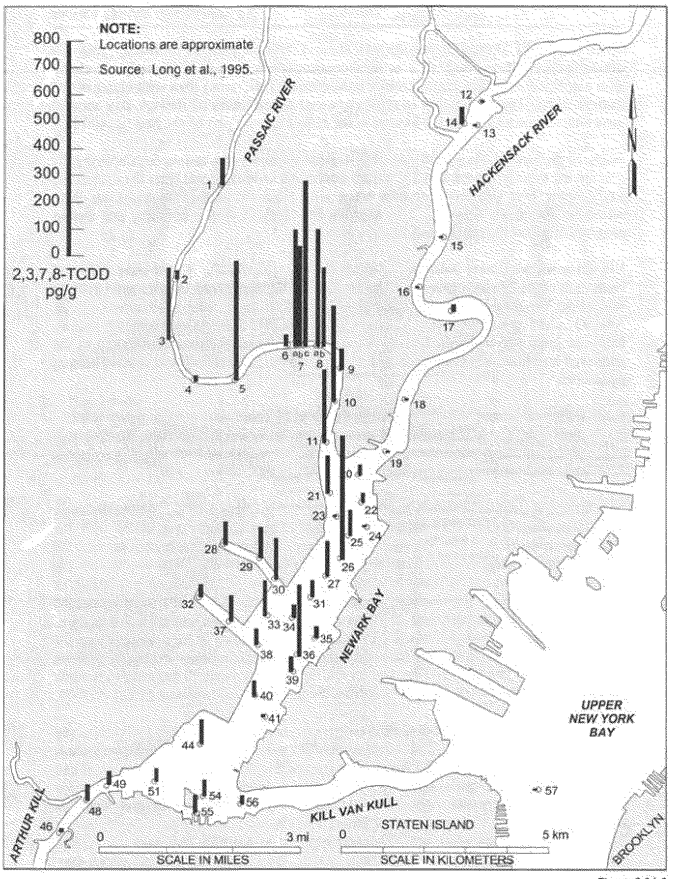
Even though the manufacture of PCBs was banned in 1979, their presence in Newark Bay continues to grow. In some sediment samples taken from Newark Bay in 2005 and 2007 levels of PCBs exceeded 4,800 ng/g (red).

Sediment Contamination: PCBs in NY/ NJ Harbor



Sediment Contamination: Dioxin (2,3,7,8-TCDD)

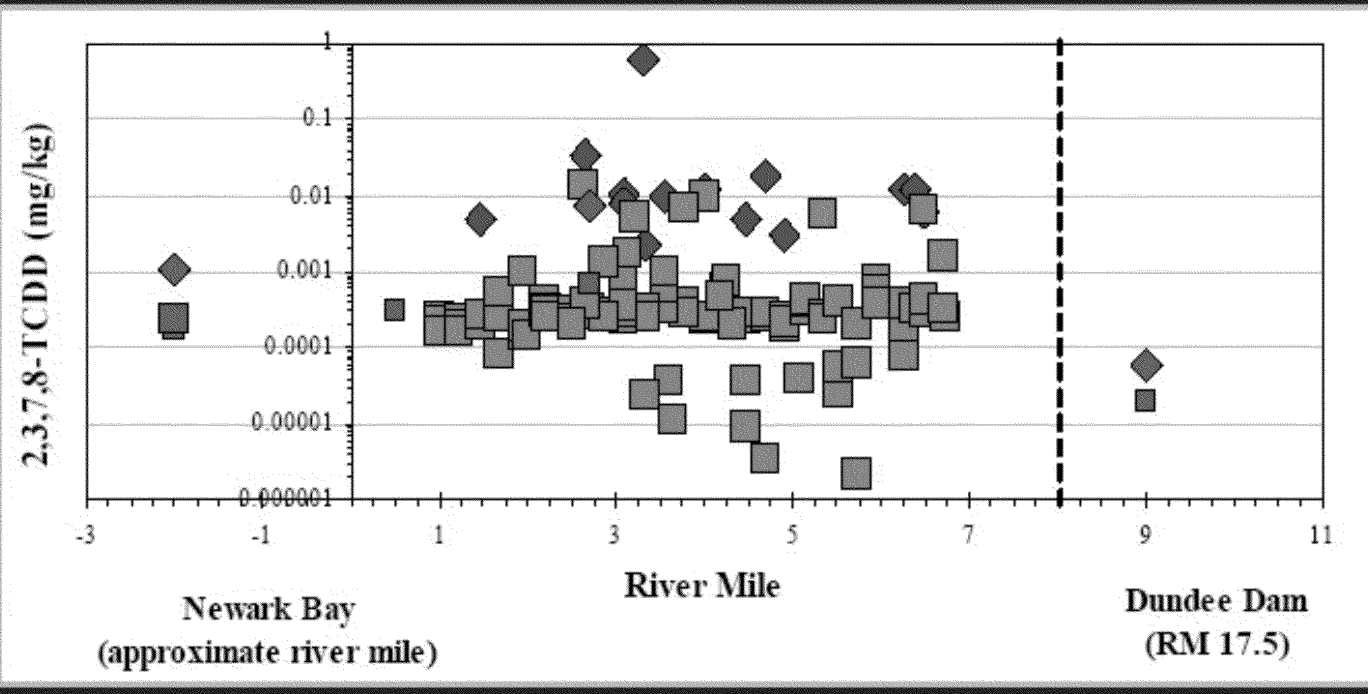
Dioxin is about the most toxic substance known to man. The maximum level of this dioxin (2,3,7,8-TCDD) that is considered acceptable in river sediments is ~1 pg/g (parts per trillion). The highest concentration shown here is >600 pg/g at river mile 3, near the Diamond Alkali site. Very high levels, ~800,000 pg/g, were found in sediments deposited in the sixties when Agent Orange was manufactured and dioxin was washed into the Passaic River.



U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Figure 3.04-6
Concentrations of 2,3,7,8-TCDD at 53 Selected Stations in Newark Bay and Vicinity

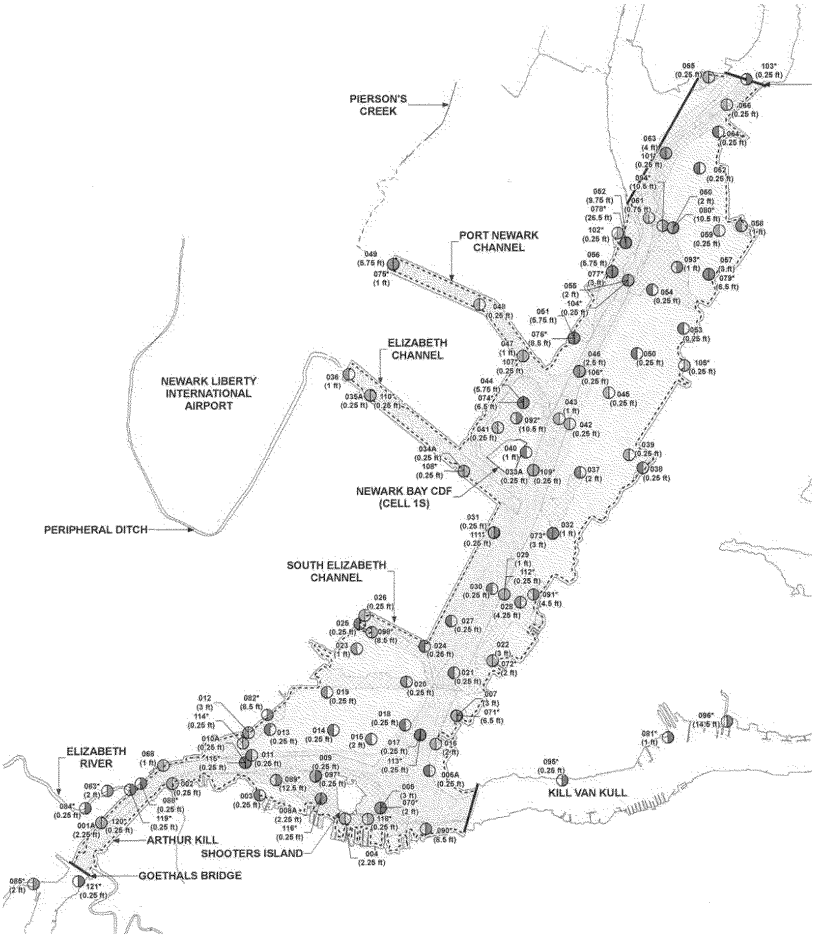
2,3,7,8-TCDD: 1963 and 1995 Concentrations



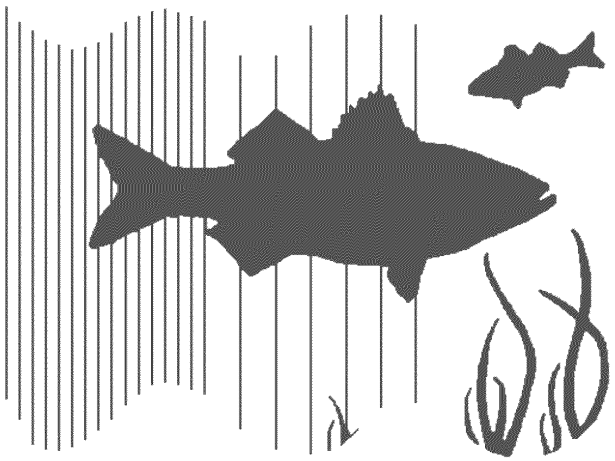
1963 Concentration
1995 Concentration
1963 (Bopp *et al.*)
1985 (Bopp *et al.*)

Sediment Contamination: Dioxin in Newark Bay

In 2005 and 2007 sediments that became contaminated with dioxin in the 1960s at the Diamond Alkali site and were washed into Newark Bay still had levels over 666 pg/g (red).



Action 1, Dredge Legacy Pollutants (PCBs and Dioxin) from Lower Passaic River! Restore Fishable Waters!



Benefits

- ☻ Reduce illness and medical costs for people eating sea food.
- ☻ Improve health and diversity of the biota in the waters and sediments of the Lower Passaic River, Newark Bay and all of the NY/NJ Harbor reducing future clean-up costs.
- ☻ Restore healthy habitats for fish improving "opportunities for recreation, tourism, and fisheries – industries valued at over $20 billion per year that depend on a clean Harbor Estuary."

[redacted]

Action 1, Dredge Legacy Pollutants (PCBs and Dioxin) from Lower Passaic River

Benefits

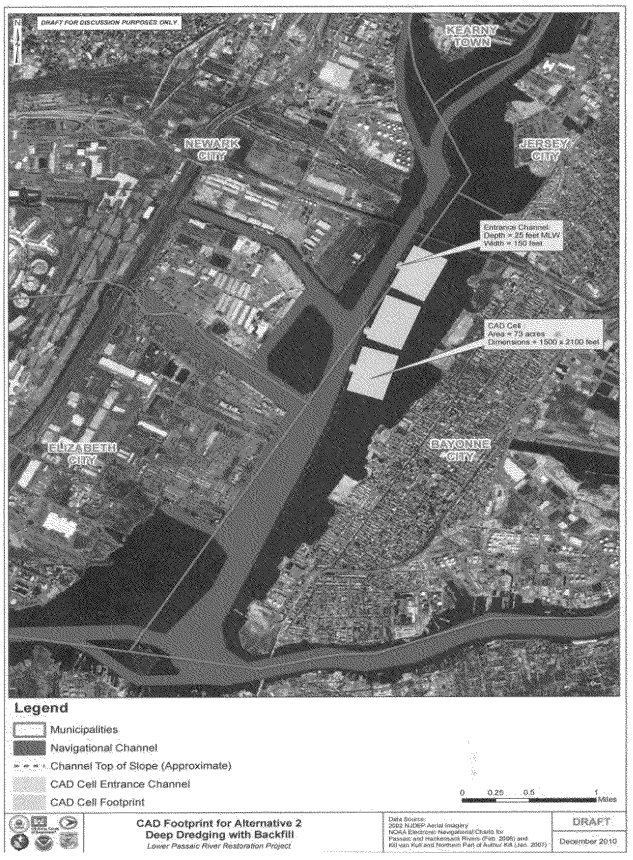
☻ **Improve navigation in the Lower Passaic River, Newark Bay, and the NY/NJ Harbor.**

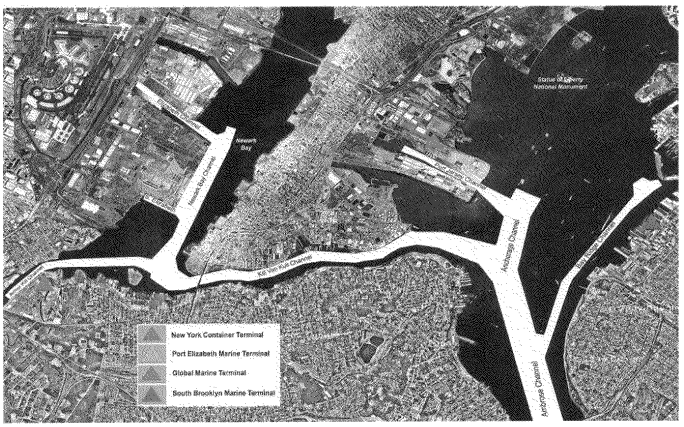
Costs

"The Federal interest in navigation derives from the Commerce Clause of the Constitution." Since the 1940s the Federal Government has neglected its duty to keep the authorized navigation channels in the Lower Passaic River clear of contaminated sediments.

☐ **Cost of dredging paid from U.S. Defense budget?**

Action 2, Move Dredged Sediments from Water to Land! Do not use CADs or CDFs!





Benefits

☻ Reduction in flooding.

☻ No maintenance costs.

Costs

☐ 200+ acres of land under water not "free" for DMM!

Action 3, Decontaminate Dredged Sediments for Beneficial Uses

Do not use Non-Decontaminating Treatment

Chemistry of Contaminants:
PCBs and Dioxin--
Kill or harm biota,
Persist in temperatures up to ~2,000°F

Decontaminating:
☻ **Thermal-Chemical Treatment**
PCBs and Dioxin destroyed at temperatures of ~2,500°F

Non-Decontaminating:
(Do not use!)

- ☐ Wetlands Restoration
- ☐ Biological Treatment (STPs)
- ☐ Sediment Washing
- ☐ Incineration
- ☐ Off-site Disposal

Action 3, Decontaminate Dredged Sediments for Beneficial Uses! Do not use "Off-site" Disposal!

Costs of "Off-site" Disposal

- Few facilities that accept PCB wastes are located in western states.
- High shipping costs to western facilities.
- High greenhouse gas emission costs.
- No PCB waste facility will immobilize heavy metals.
- Dumping anywhere in the U.S. or Canada will cause high ecologic/economic costs.

Benefits of "Local Decon"

- "The Port of New York and New Jersey is the largest port on the East Coast, providing more than 230,000 direct and indirect jobs in port related activities."
- Clean sediments throughout the harbor can save at least $25,000,000 per year in costs of maintaining the harbor's water transportation infrastructure.

Action 3, Decontaminate Dredged Sediments for Beneficial Uses by Thermal-Chemical Treatment!

Benefits

- ☻ Permanent destruction of Legacy Sediment Contaminants, PCBs and Dioxin , at temperatures of ~2,500°F.
- ☻ Immobilization of heavy metals .
- ☻ Beneficial use of contaminated sediments dredged from the Lower Passaic River, Newark Bay, NY/NJ Harbor, and eastern USA.

Costs

- ☐ Treatment costs?

Thermal-Chemical (Cement-Lock®) Treatment

Cement-Lock Principles

Cement-Lock is a patented thermo-chemical manufacturing process using a rotary kiln as a melter that treats multi-contaminated sediment by disassociating (destroying) organic contaminants at 2500°F and encapsulating metal contaminants in a pozzolanic glassy matrix. The glassy matrix (Ecomelt® is pulverized and used as a 30-40% replacement for Portland cement in concrete.

Organic Contaminants Destroyed:

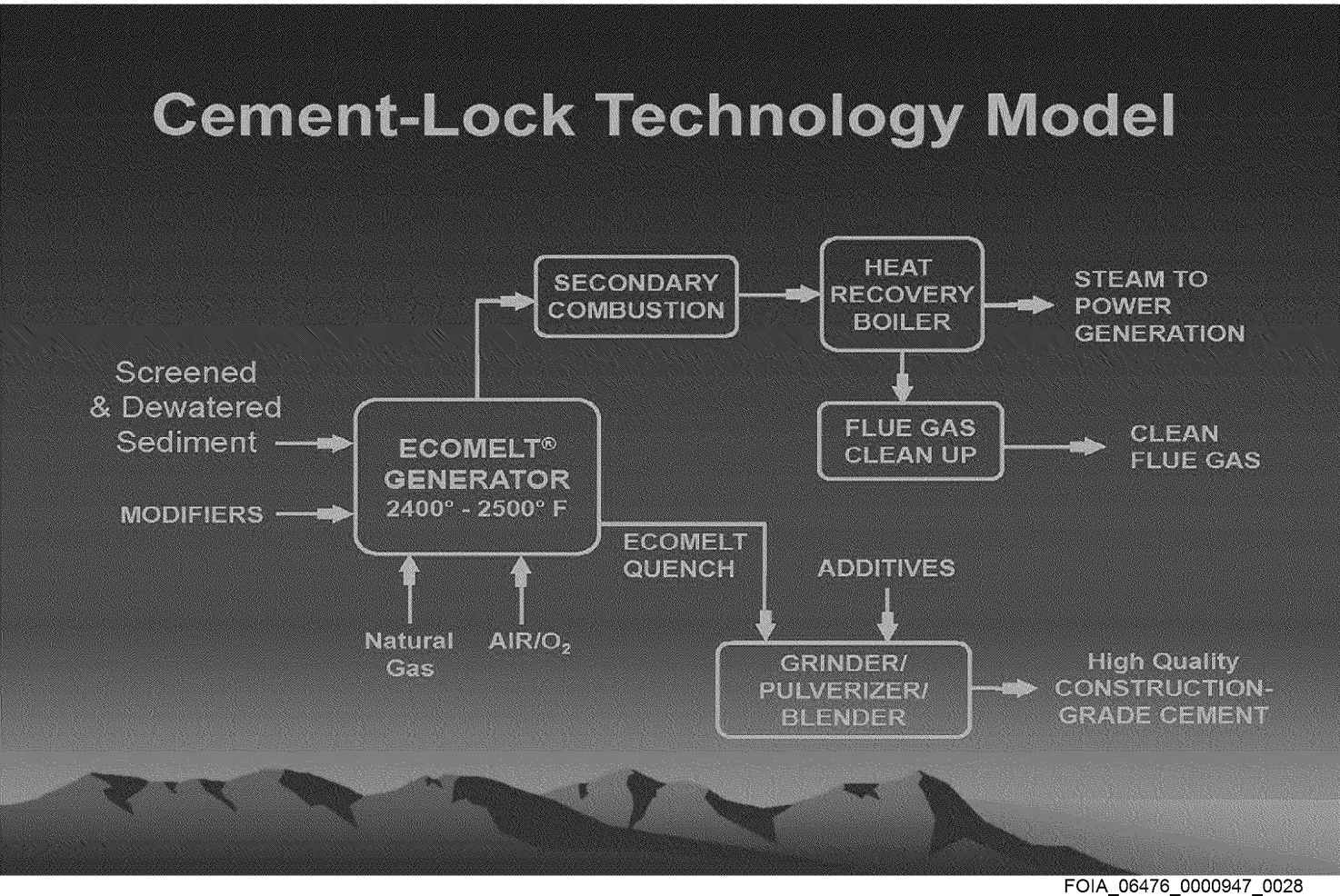
Oil & Grease, PAHs, Pesticides, PCBs, Insecticides, Dioxins/Furans

Heavy Metals Immobilized:

Cadmium, Chromium, Copper, Lead, Selenium, Silver

Mercury (a volatile element) is captured.

Thermal-Chemical (Cement-Lock®) Treatment



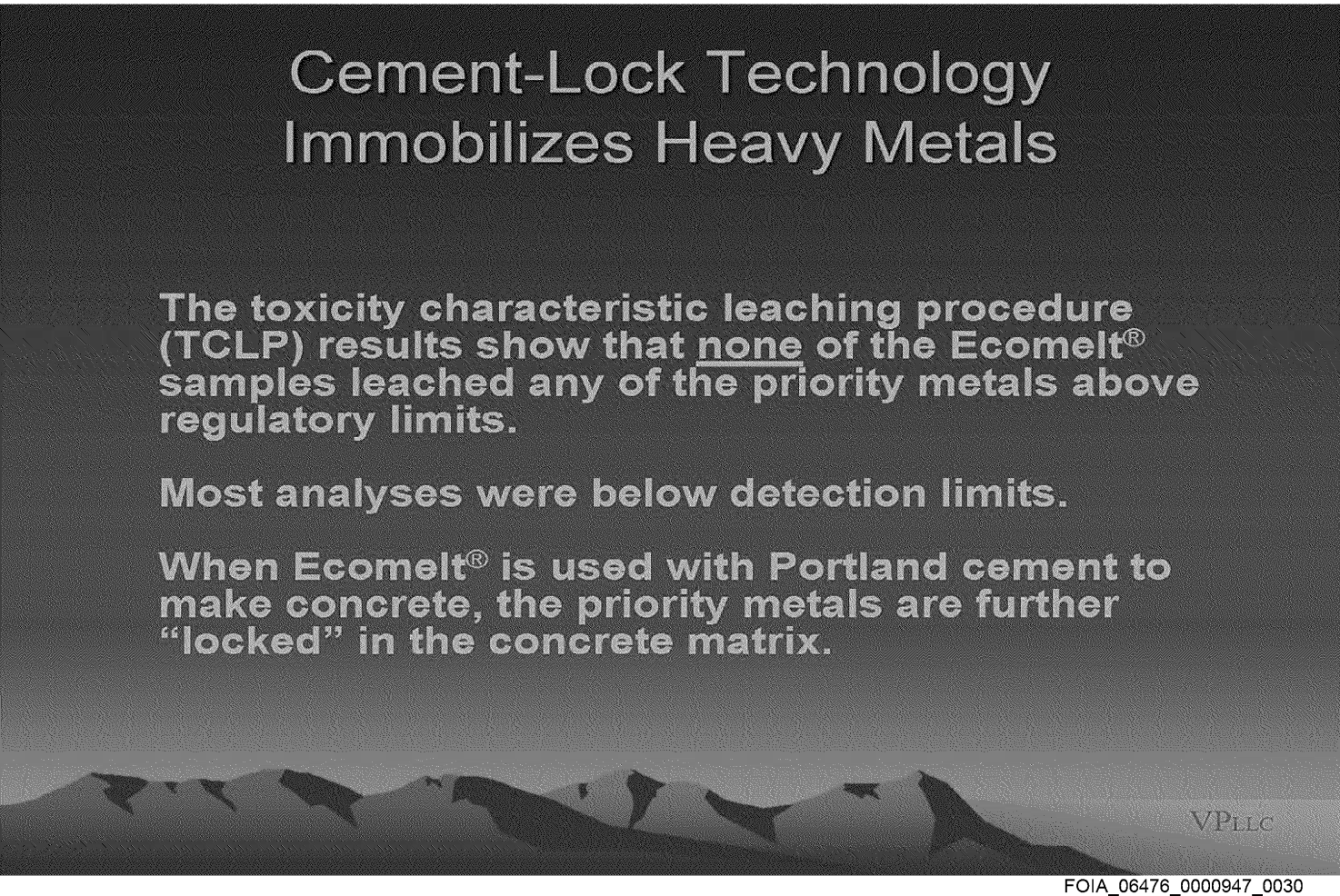
Thermal-Chemical (Cement-Lock®) Treatment

Cement-Lock Commercial Plant State-of-the-Art Air Pollution Control

- Heat recovery (from flue gas) for steam generation and electric power production
- Selective Catalytic Reduction (SCR) for NOx control
- Lime (calcium oxide) injection for acid gas (SOx and HCl) capture
- Bag house (fabric filter) for capturing spent lime and particulates
- Powdered activated carbon injection for mercury control
- Bag house fabric filter for capturing spent activated carbon

VPLLC

Thermal-Chemical (Cement-Lock®) Treatment



Thermal-Chemical (Cement-Lock®) Treatment

Thermal-Chemical (Cement-Lock®) Treatment

Cement-Lock Benefits

- Reducing / Eliminating Reliance on CADs/CDFs
  - No Long-Term Maintenance and Monitoring
- Reducing Reliance on Landfills
- Beneficial Use (cement, energy)
- No Long-Term Liability

Contaminants are taken out of the ecosystem and watershed environment of the Passaic River

There is minimal waste generated

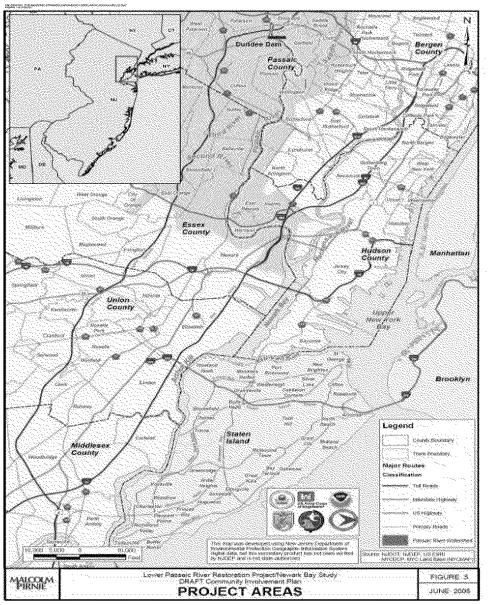
VPLLC

[redacted]

[redacted]

Working for a Better Future for the Lower Passaic River and Newark Bay

Navigable, Fishable Waters aren't just our Goals. They are our Future!!!



We hope that the actions we're recommending will stimulate discussion among involved parties so that mutually acceptable ways will be found to fund these projects as soon as possible. We hope that you and your community will work with us to encourage the implementation of these projects so that in the future the millions of people living and working in the area, as well as visitors from around the world, can enjoy the ecologic and economic benefits of a healthy river and harbor. This effort is critical for restoring economic prosperity to this region!

Working for a Better Future for the Lower Passaic River and Newark Bay

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